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ABSTRACT

This is one of eighteen sets of individualized mathematics problems developed by the Oregon Vo-Tech Math Project. Each of these problem packages is organized around a mathematical topic and contains problems related to diverse vocations. Solutions are provided for all problems. Problems involving the construction and interpretation of graphs and tables are presented in this volume. These problems are drawn from five vocational areas: forestry, marketing, clerical work, diesel mechanics, and food processing. (SD)

I
L INDIVIDUALIZED
S LEARNING
SYSTEMS

Individualized Math Problems in

Graphs & Tables

Oregon Vo-Tech Mathematics Problem Sets

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Individualized Learning Systems

MATHEMATICS

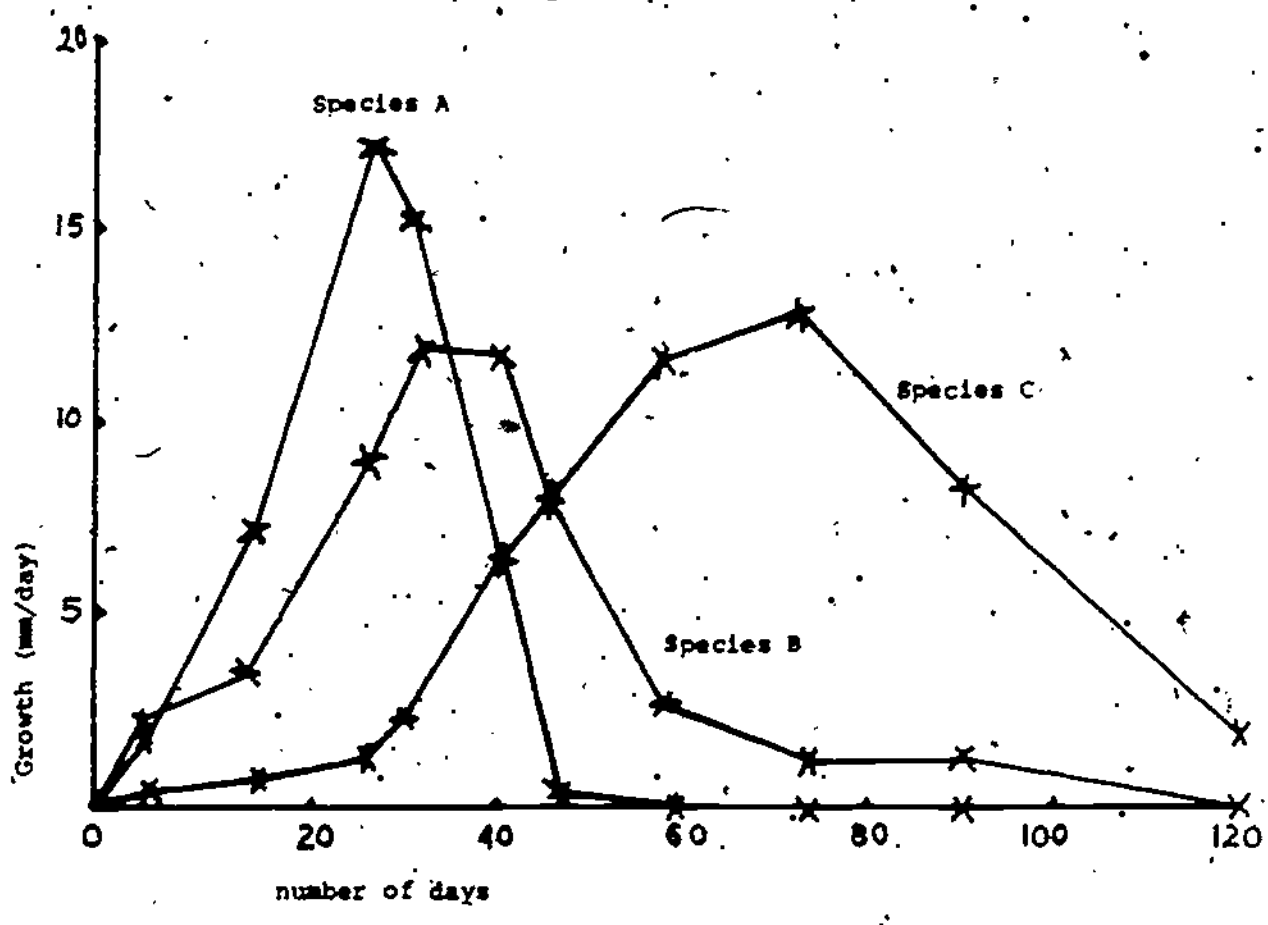
Graphs & Tables

The host school for this project was Linn-Benton Community College Albany Oregon The project was funded by two sources the Oregon Math Education Council (OMEC) and through Part B Federal Funds under contract for the Division of Instructional Support-Career Education Oregon State Department of Education under the authority of the Vocational Education Act of 1963 as amended in 1968 Questions regarding use reproduction or availability of these materials should be addressed to the Curriculum Coordinator State Department of Education 942 Lancaster Drive NE Salem Oregon 97310

A. Problems with complete solutions.

1. On the same set of axes construct a broken line graph for each of the species indicated in the table. Use days on the Horizontal axes and growth on the vertical.

Number of Days	Growth (mm/day) species A	species B	species C
0	0	0	0
5	2	2.5	.5
15	7	3.5	.75
25	17	9	1
30	15	11	2
40	6	11	6
45	1	8	8
60	0	3	11
75	0	1	12
90	0	1	7.5
120	0	0	1.5

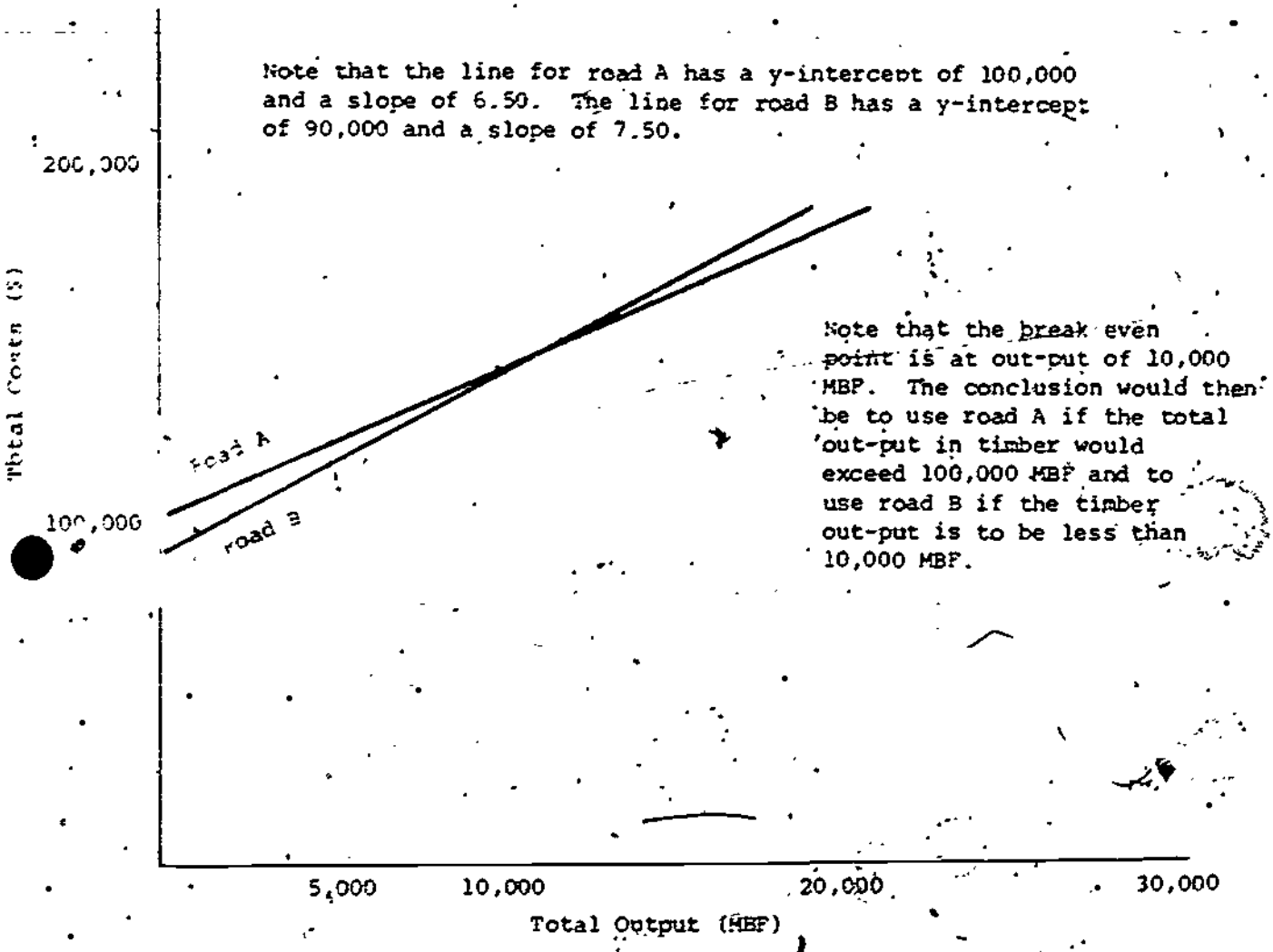


B. Problems without solutions.

2. Often, in a timber sale, to reach the timber it is necessary to construct a logging road. There are two types of roads to consider: Type A which has an initial cost of $100,000 and type B which costs $90,000. Since type A is a better road, hauling costs are only $6.50/M Bdft as compared with $7.50 /M Bdft on the type B road. Determine the break even point (in M Bdft hauled) on the two roads by graphing a straight line for each road, using total cost on the vertical axis and total output (M Bdft) on the horizontal axis.

Complete solutions to B problems.

2.



Note that the line for road A has a y-intercept of 100,000 and a slope of 6.50. The line for road B has a y-intercept of 90,000 and a slope of 7.50.

Note that the break even point is at out-put of 10,000 MBF. The conclusion would then be to use road A if the total out-put in timber would exceed 100,000 MBF and to use road B if the timber out-put is to be less than 10,000 MBF.

GRAPHS

Marketing

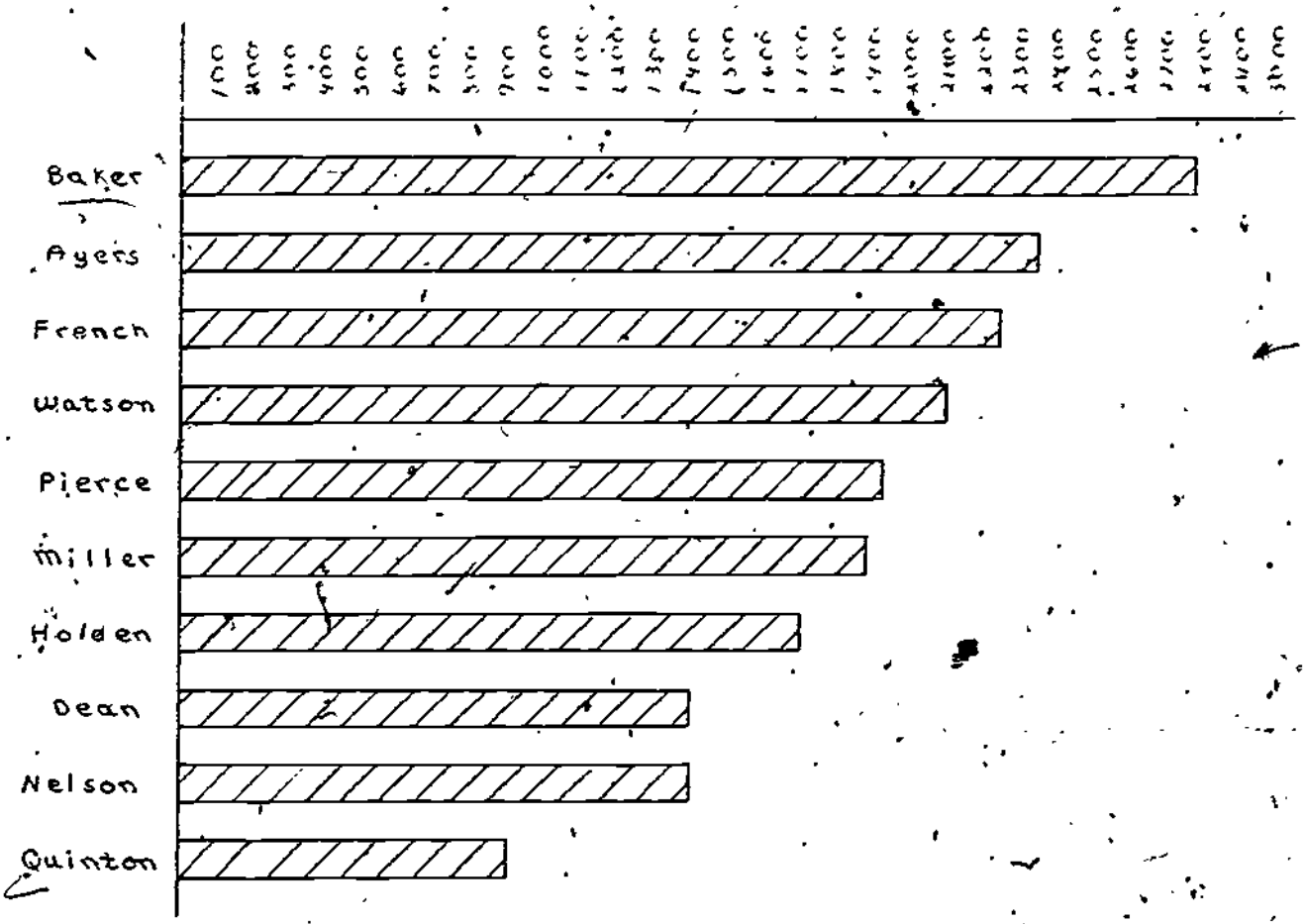
SEE CLERICAL FOR GRAPH PROBLEMS

A. Problems with Solutions

1. Make a horizontal bar graph of the net sales of the clerks employed by the Ingram Hardware Store during the period September 1 through September 15, 1970. (Arrange in order from highest to lowest sales.)

Ayers	$2,350	Quinton	$ 900
Holden	1,700	Baker	2,780
Pierce	1,925	French	2,250
Watson	2,100	Nelson	1,400
Dean	1,400	Miller	1,875

Solution:

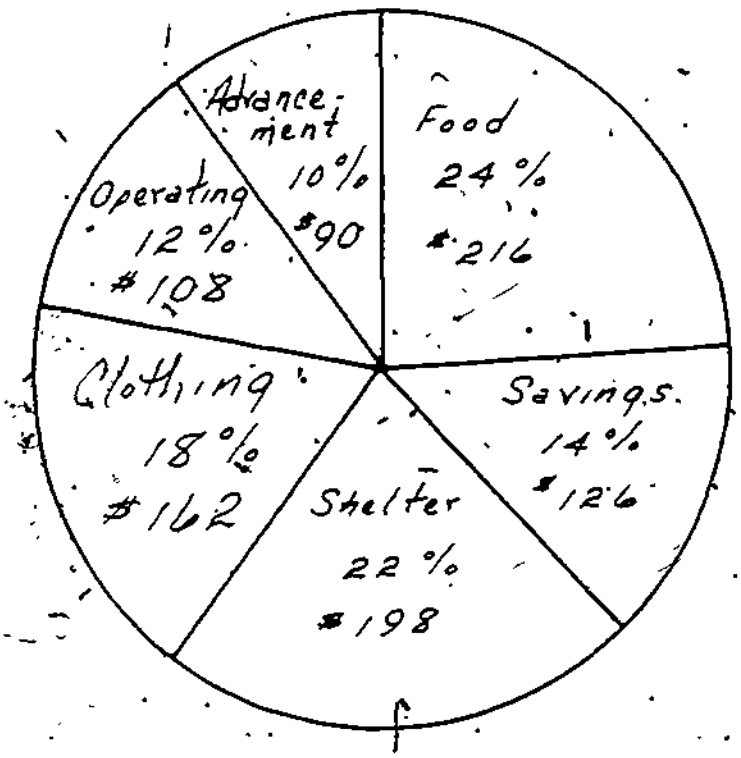


A. Problems with Solutions (continued)

2. Make a circle graph of the planned monthly budget of the Charles Eason family for July, 1971. Express the following items in both dollars and percents.

Food	24%
Savings	14%
Shelter	22%
Clothing	18%
Operating	12%
Advancement	10%
	100% = $900

Solution:



A. Problems with Solutions (continued)

3. The Smith Department Store had sales, cost of goods sold, expenses, and profit or loss for the years 1961 to 1970 as shown in the table that follows. Figures are in thousands of dollars.

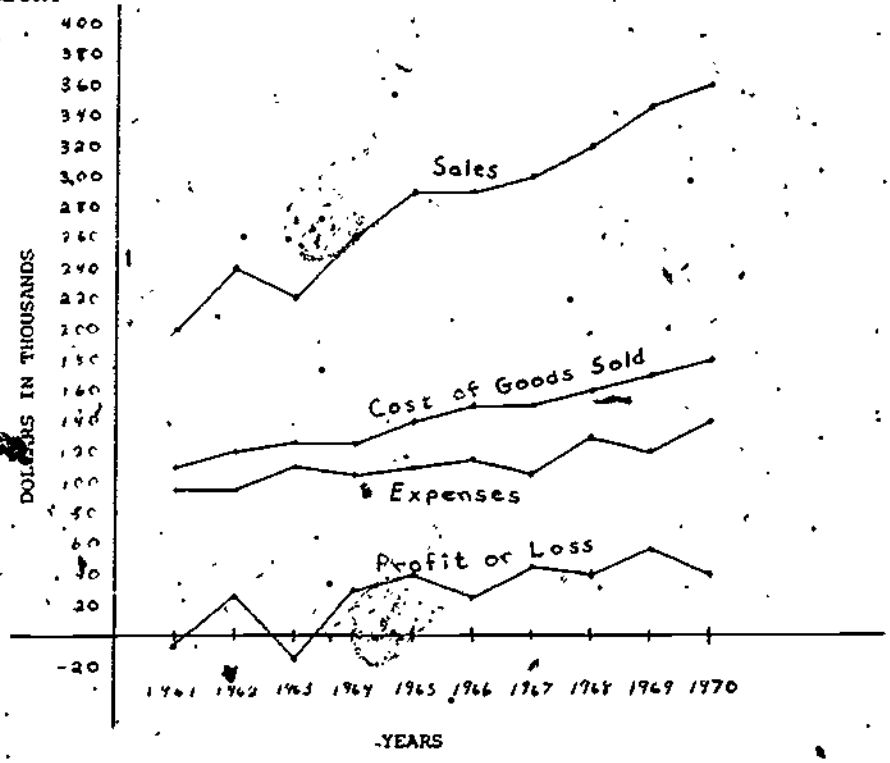
Year	Sales	Cost of Goods Sold	Expenses	Profit or Loss
1961	$200	$110	$ 95	-$ 5
1962	240	120	95	25
1963	220	125	110	- 15
1964	260	125	105	30
1965	290	140	110	40
1966	290	150	115	25
1967	300	150	105	45
1968	320	160	130	40
1969	345	170	120	55
1970	360	180	140	40

Express the relationship of the amounts of these items in a multiple broken-line graph.

Curved lines instead of straight lines could have been used for this graph.

NOTE: The time factor is placed on the X axis.

Solution:



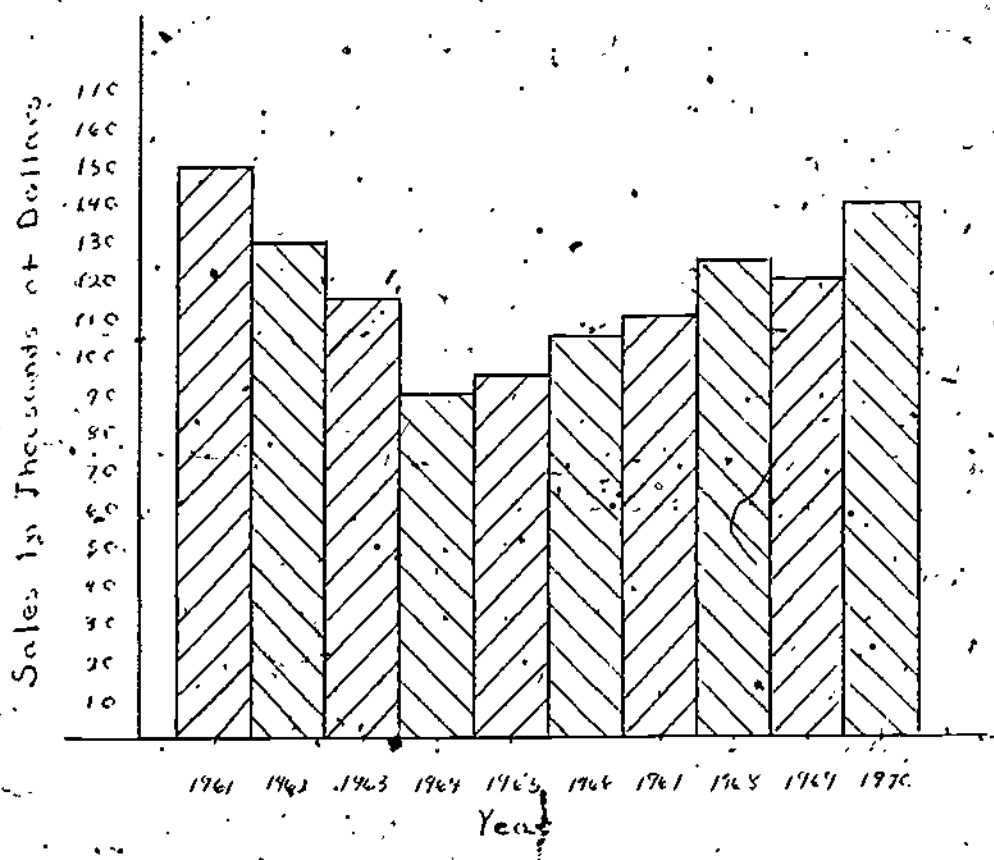
A. Problems with Solutions (continued)

4. Make a vertical graph of the sales volume of the Brown Company for the years 1961 to 1970.

Year	Sales
1961	$150,000
1962	130,000
1963	115,000
1964	90,000
1965	95,000
1966	105,000
1967	110,000
1968	125,000
1969	120,000
1970	140,000

This type of graph is ordinarily used to compare quantity in relation to value or quantity, value in relation to time, or quantity in relation to time.

Solution:



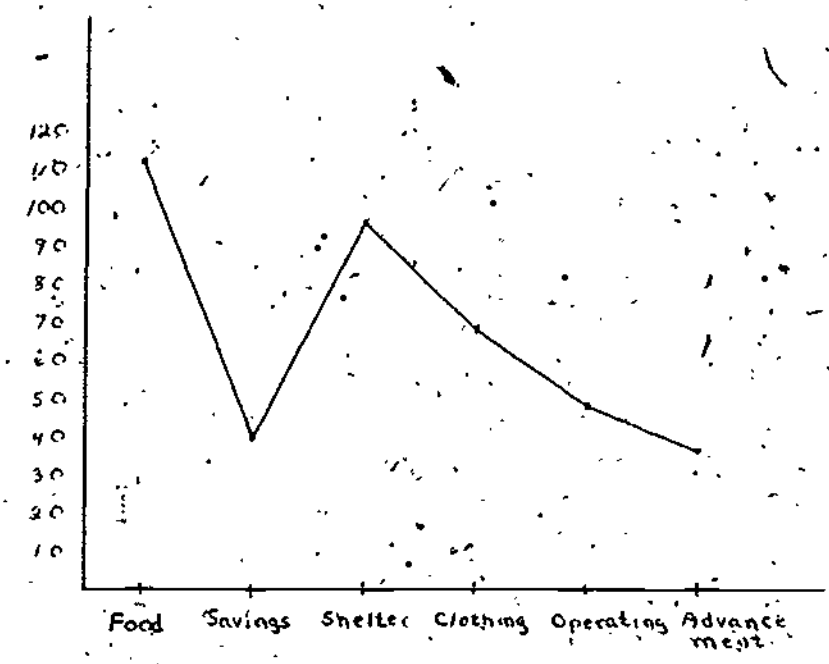
A. Problems with Solutions (continued)

5. Make (a) a single-line graph and (b) a rectangle graph, showing relationship of the following in dollars and in percents. These items represent the monthly expenditure of the James Vincent family in May, 1970.

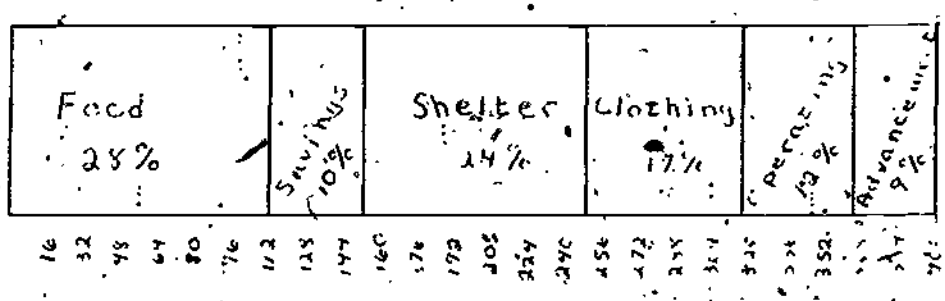
Food	$112.00
Savings	40.00
Shelter	96.00
Clothing	68.00
Operating	48.00
Advancement	36.00

Solution:

(a)



(b)



RELATIONSHIP OF EXPENDITURE IN DOLLARS

B. Problems without Solutions

6. A bank has had yearly increases in its demand deposits since 1964. Show the demand deposits in horizontal form. The deposits were $45 million-1964, $50 million-1965, $52 million-1966, $56 million-1967, $59 million-1968, $64 million-1969, and $68 million-1970.

Solution:

7. A hotel company that has expanded rapidly wishes to plot its profit before taxes and net profit on a line graph for the annual stockholders' report. Profits before taxes in the millions for 1961 through 1970 were: 2.75, 2.8, 2.95, 4, 5, 8, 7, 8.5, 12 and 15. Net incomes in the millions for 1961 through 1970 were: 1.75, 1.60, 1.75, 1.85, 1.9, 3.1, 4.2, 5, 6.25, and 8.25. Plot the profits.

Solution:

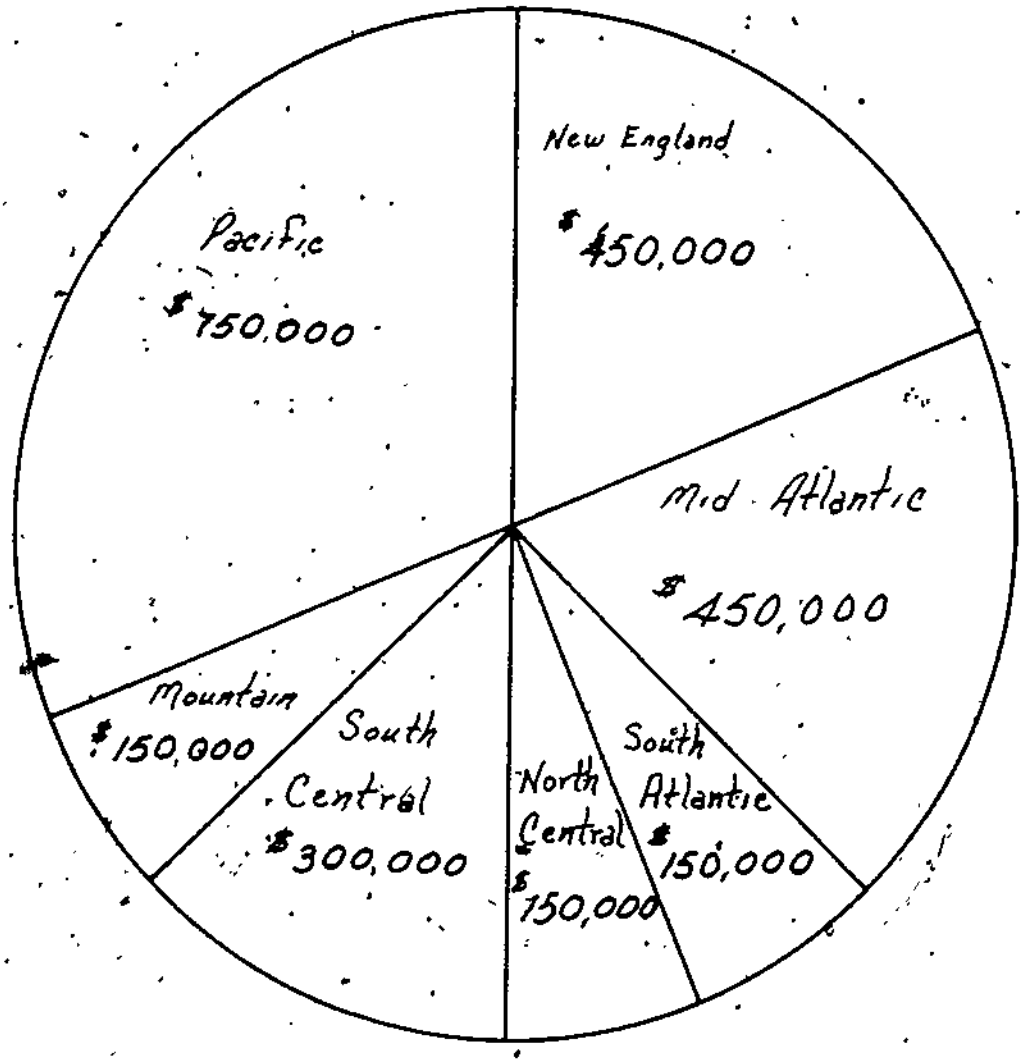
B. Problems without Solutions (continued)

8. The Caravan Rainwater Company's sales for last year were divided geographically as follows:

New England States	$450,000
Mid-Atlantic States	450,000
South Atlantic States	150,000
North Central States	150,000
South Central States	300,000
Mountain States	150,000
Pacific States	750,000

Show this breakdown on a pie chart. Select a caption for the chart. Letter it carefully. Letter the information on the appropriate sections neatly. Color your chart in several colors.

Solution:



B. Problems without Solutions (continued)

9. The Plimpton Metals Corp. shows in its annual report a graph of tonnages shipped as follows:

1968	370,000 tons
1969	310,000 tons
1970	380,000 tons
1971	390,000 tons
1972	420,000 tons

Prepare a set of rectangular coordinates, plot shipments as ordinates, and draw the graph.

Solution:

B. Problems without Solutions (continued)

10. Make a vertical bar graph of the stock of men's $5.00-shoes in the Oliver Department Store, December 31, 1968. Note: In a stock-record graph of this kind, sizes 1 to 6 1/2 need not be indicated.

Size	No. Pairs	Size	No. Pairs	Size	No. Pairs
7	63	9	135	11	146
7 1/2	90	9 1/2	178	11 1/2	118
8	129	10	160	12	84
8 1/2	146	10 1/2	182	12 1/2	37

Solution:

B. Problems without Solutions (continued)

11. Construct a pie chart for the following dollar costs of the XYZ Corporation.

Labor	40%	Equipment	10%
Fuel	6%	Materials	26%
Taxes	8%	Net Income	10%

Solution:

B. Problems without Solutions (continued)

12. In order to make a change in the credit and collection policy of the Johnson Hardware Company, the manager wishes to have the credit information for the past five years shown in graphic form. You are to prepare a line graph showing the information listed below.

	1960	1961	1962	1963	1964
Accounts not due	$21,448	$20,165	$22,678	$23,740	$23,435
1-30 days	13,545	15,690	15,125	18,750	19,120
30-60	7,568	7,400	8,875	9,920	11,460
Over 120 days-1year	1,225	1,494	2,670	3,335	4,245
Over 1 year	325	350	320	560	1,460

Solution:

B. Problems without Solutions (continued)

18. Construct a line chart to indicate the highest price per month of stock XYZ as given.

Month	Highest Quotation	Month	Highest Quotation
January	16	July	20
February	18	August	21
March	18	September	28
April	18	October	30
May	24	November	36
June	26	December	40

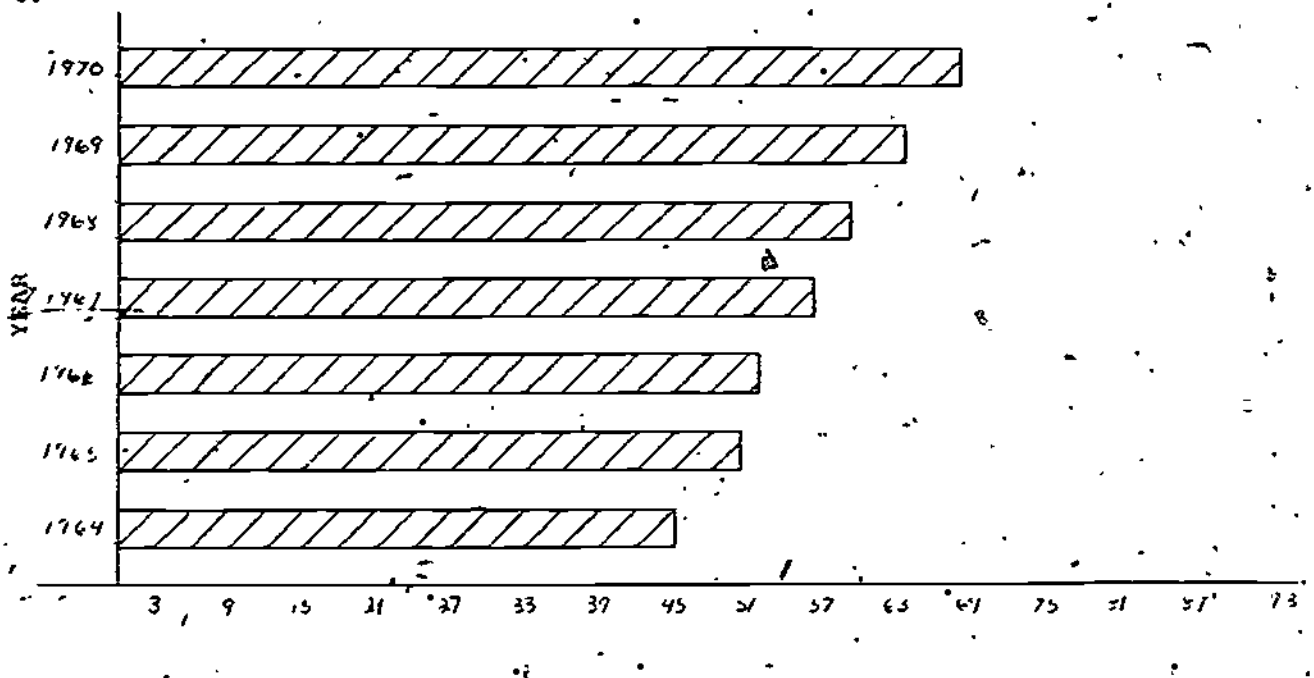
Solution:

B. Problems without Solutions (continued)

14. STV, a mini-conglomerate, derived $800,000 in revenue from five wholly owned subsidiaries. The subsidiaries sales were: Company A-$100,000; Company B-$200,000; Company C-$300,000; Company D-$80,000; Company E-$120,000. Draw a circle graph showing sales in percents.

Solutions to B Problems

6.



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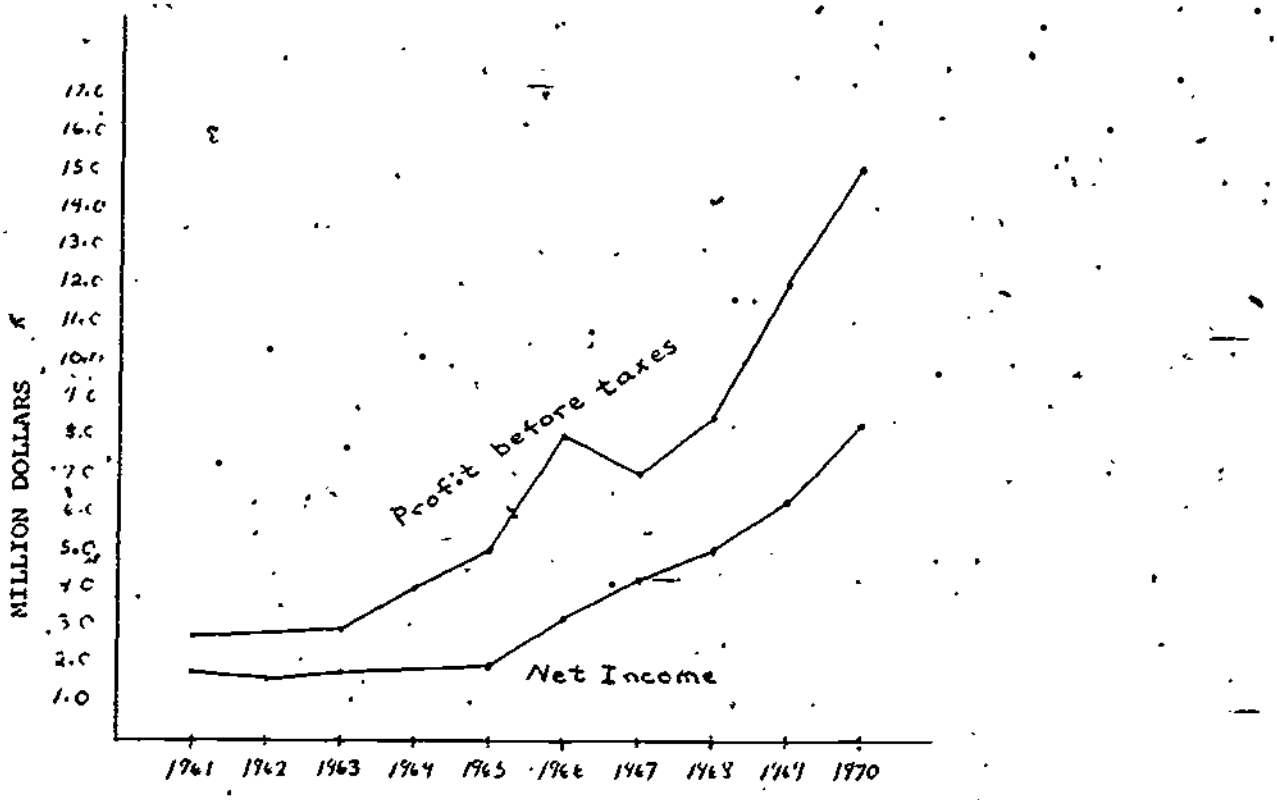
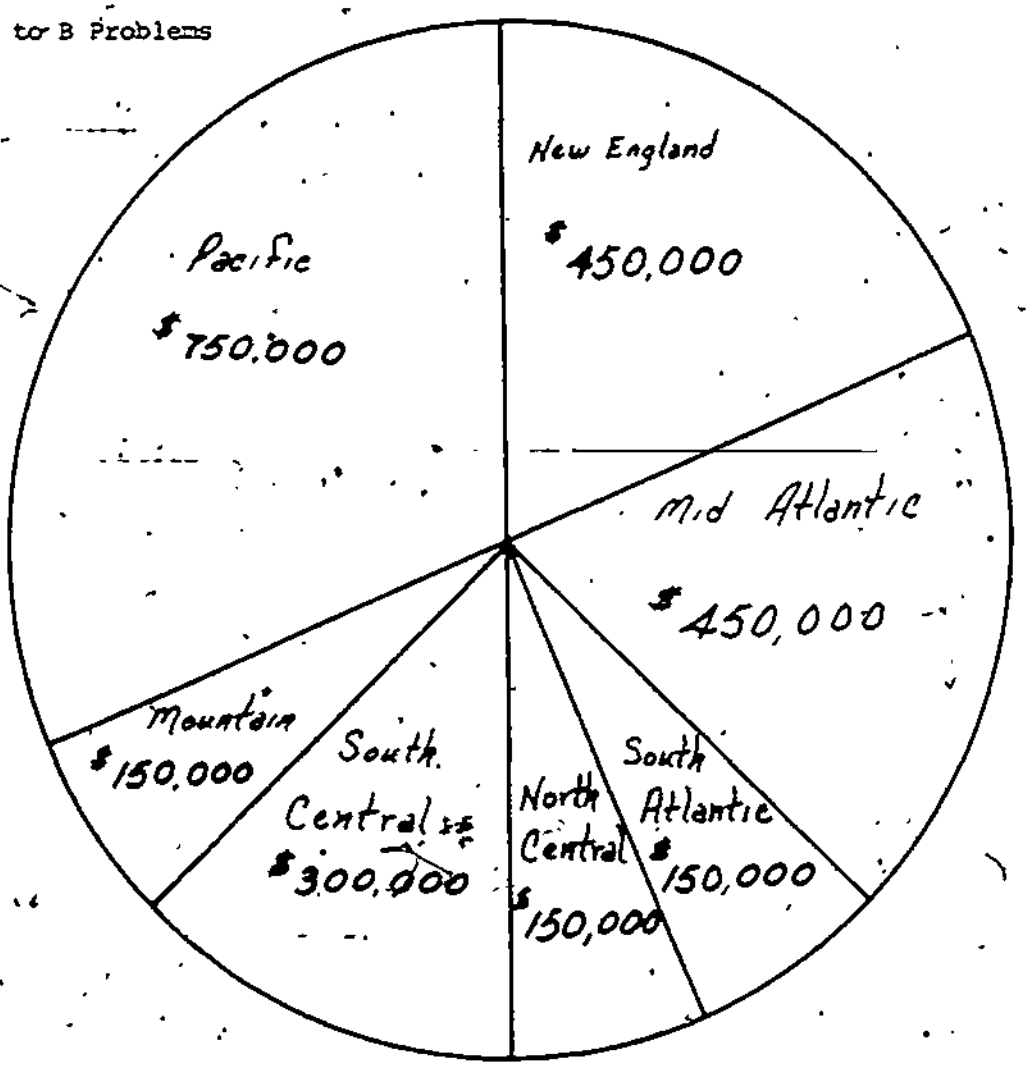


Solutions to B Problems

8.



Total Sales $2,400,000

New England States $\left(\frac{450,000}{2,400,000}\right)(360^\circ) = 68.4^\circ$

Mid Atlantic States $\left(\frac{450,000}{2,400,000}\right)(360^\circ) = 68.4^\circ$

South Atlantic States $\left(\frac{150,000}{2,400,000}\right)(360^\circ) = 22.8^\circ$

North Central States $\left(\frac{150,000}{2,400,000}\right)(360^\circ) = 22.8^\circ$

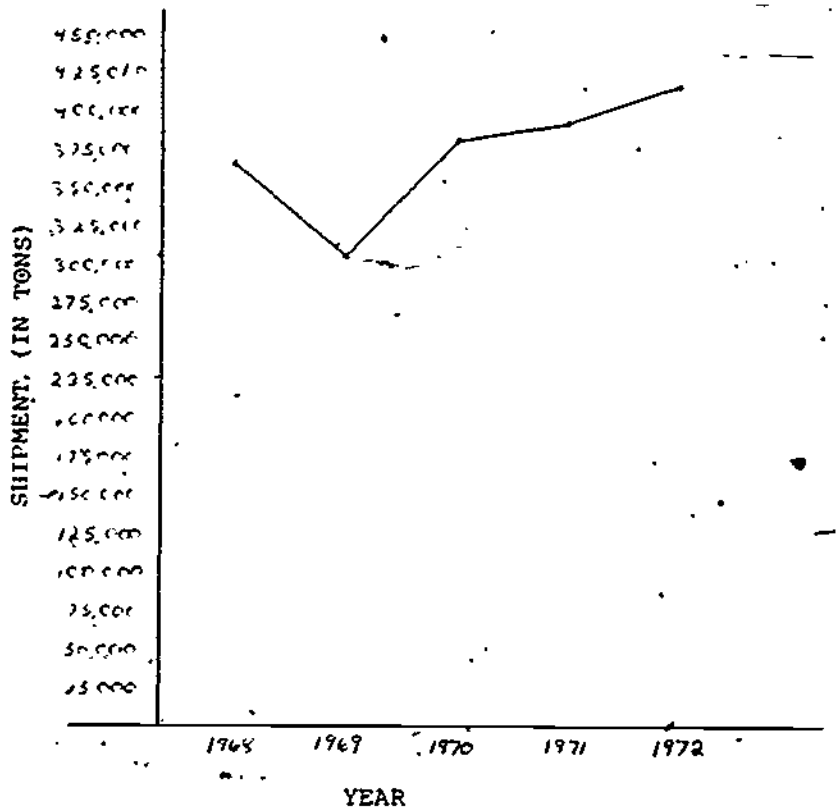
South Central States $\left(\frac{300,000}{2,400,00.}\right)(360^\circ) = 45.6^\circ$

Mountain States $\left(\frac{150,000}{2,400,000}\right)(360^\circ) = 22.8^\circ$

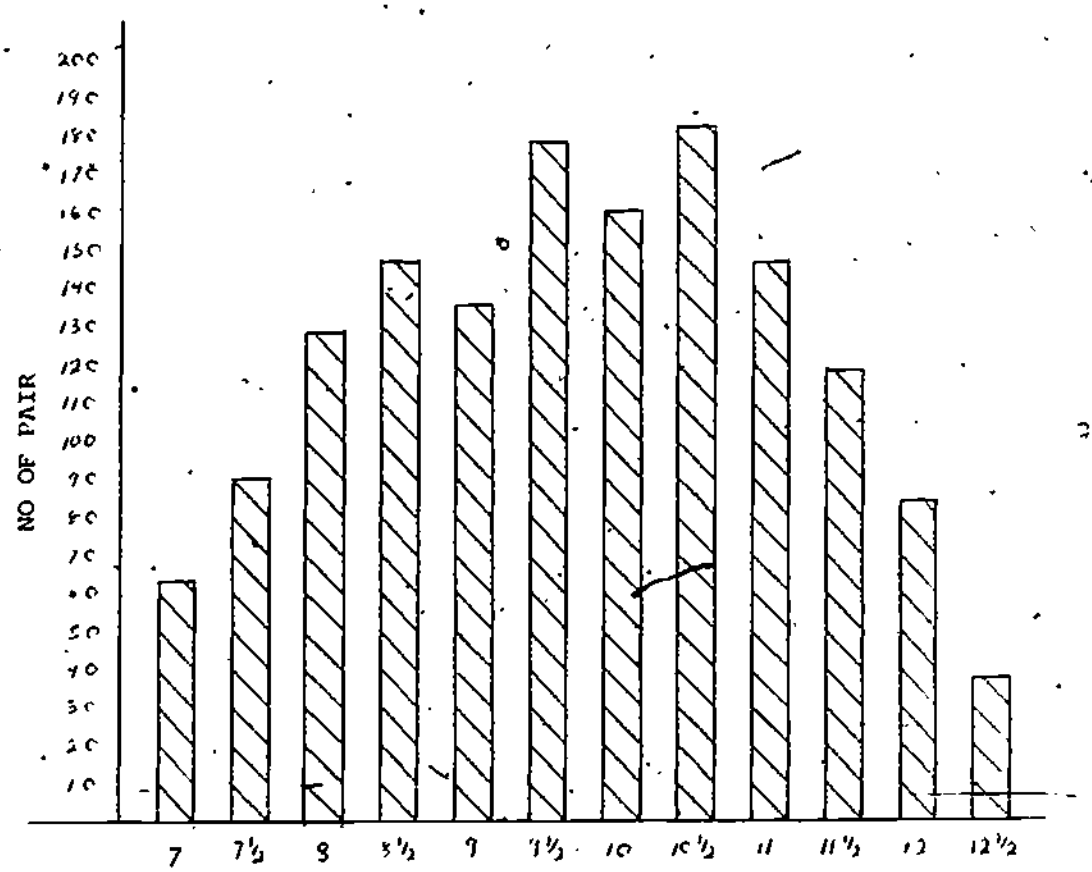
Pacific States $\left(\frac{750,000}{2,400,000}\right)(360^\circ) = 114^\circ$

Solutions to B Problems (continued)

9.

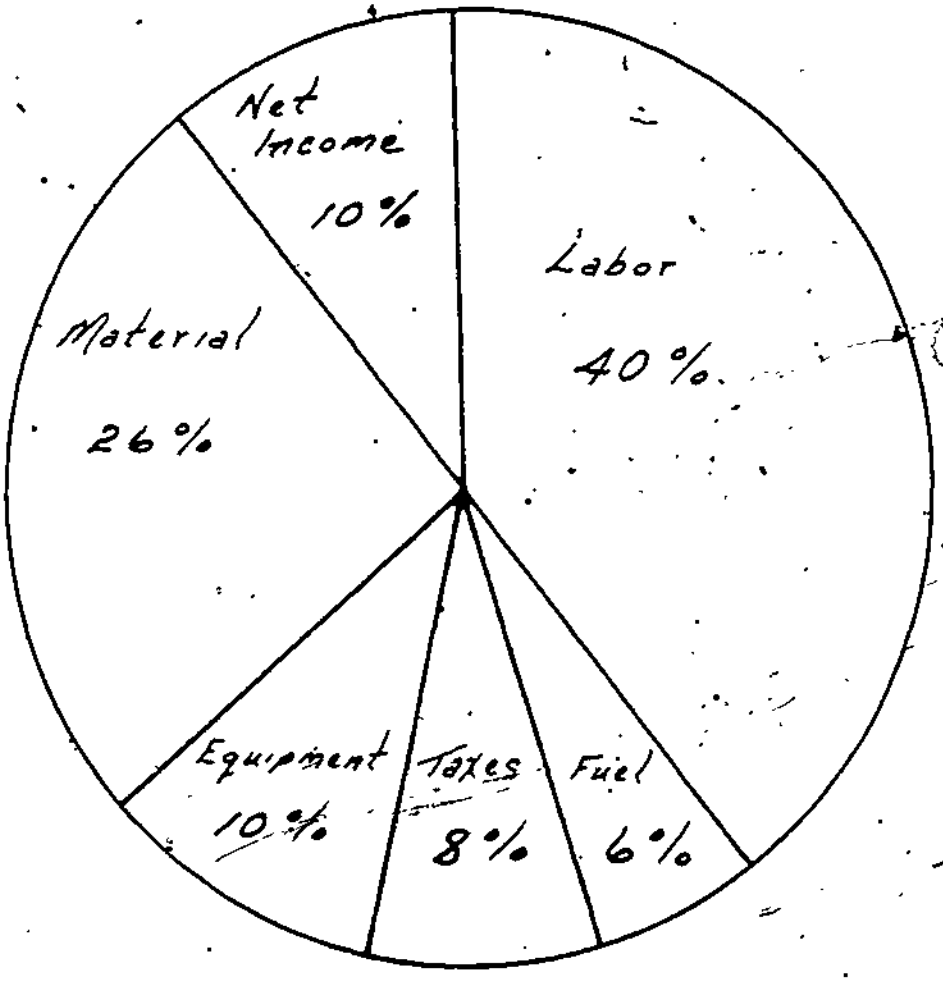


10.



Solutions to 8 Problems (continued)

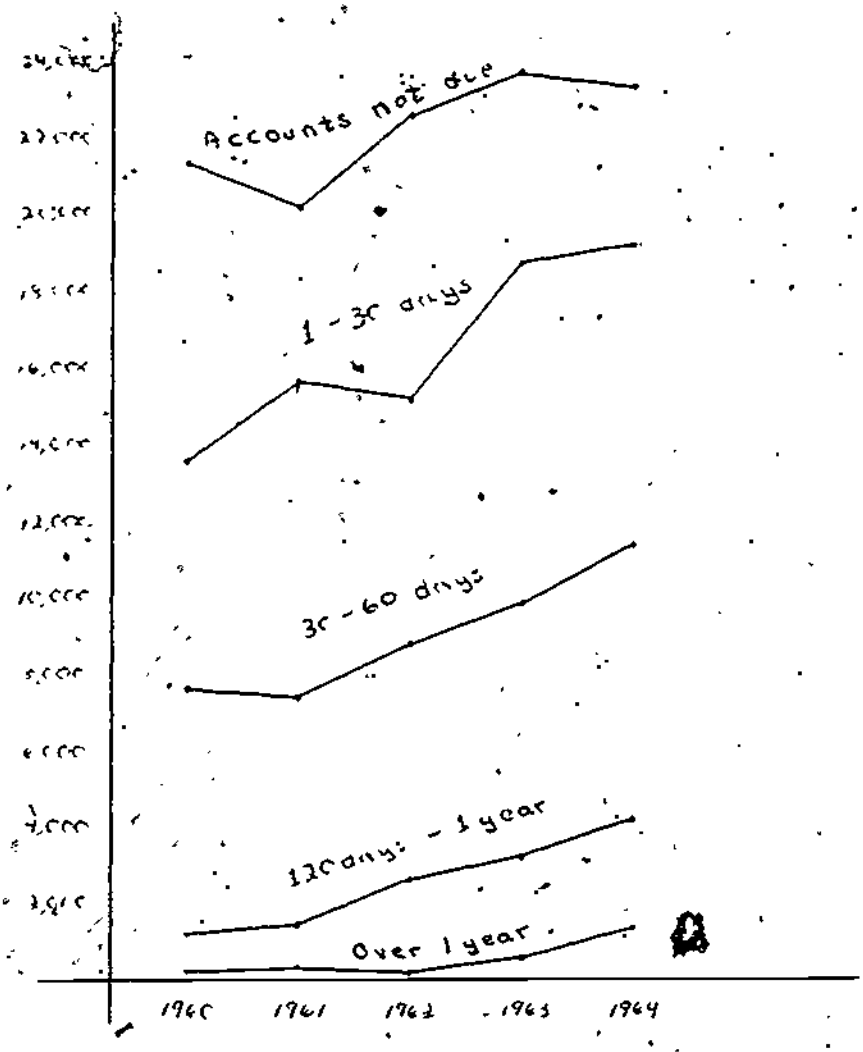
11.



Labor	40% of 360°	=	144°
Fuel	6% of 360°	=	21.6°
Taxes	8% of 360°	=	28.8°
Equipment	10% of 360°	=	36.0°
Material	26% of 360°	=	93.6°
Net Income	10% of 360°	=	36.0°

Solutions to B Problems (continued).

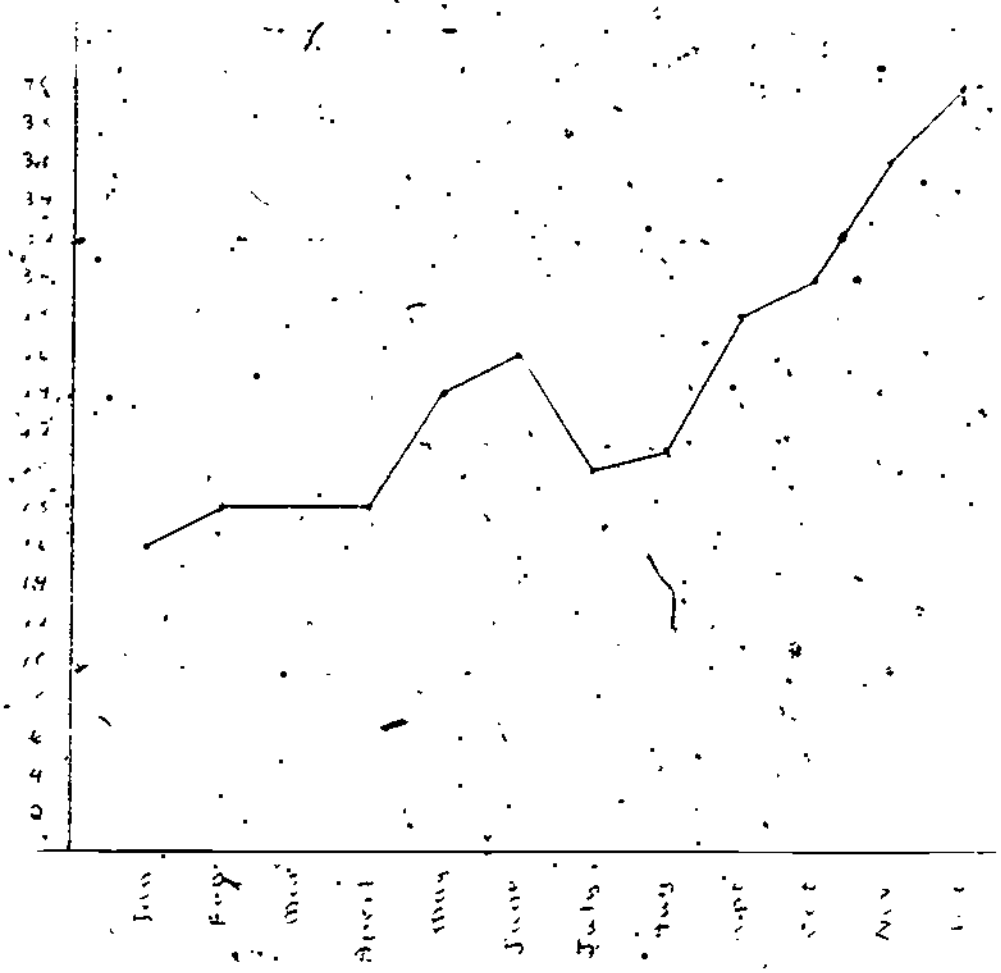
12.



JOHNSON HARDWARE CREDIT INFORMATION

Solutions to 8 Problems (continued)

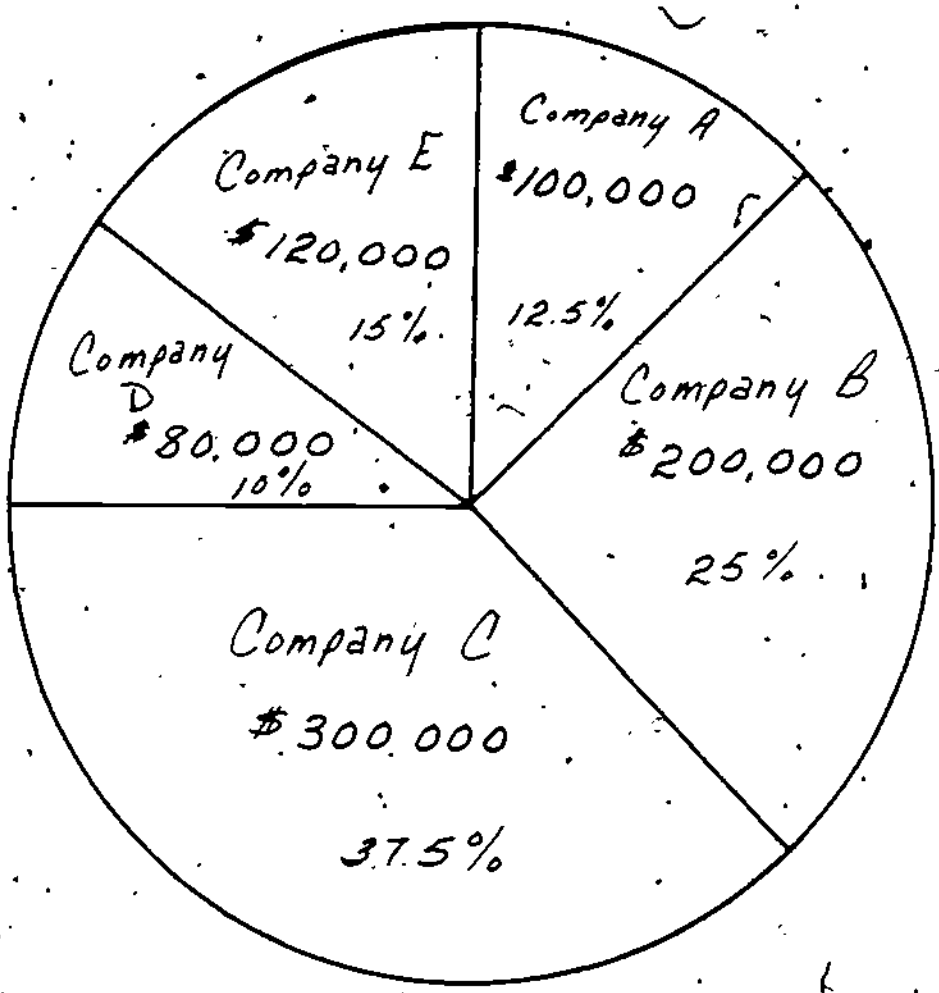
13.



HIGHEST PRICE FOR XYZ STOCK

Solutions to B Problems (continued)

14.



Company A $\left(\frac{100,000}{800,000}\right)$ (360°) = 45°

Company B $\left(\frac{200,000}{800,000}\right)$ (360°) = 90°

Company C $\left(\frac{300,000}{800,000}\right)$ (360°) = 135°

Company D $\left(\frac{80,000}{800,000}\right)$ (360°) = 36°

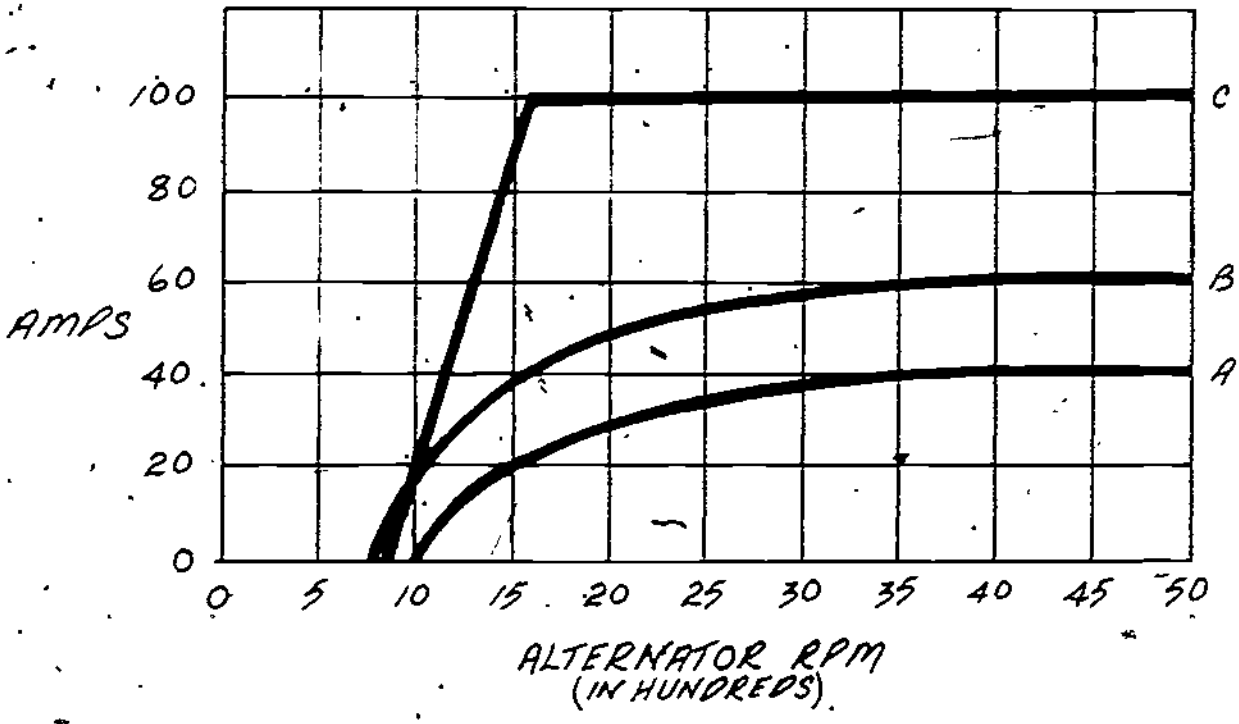
Company E $\left(\frac{120,000}{800,000}\right)$ (360°) = 54°

A. Problems with Solutions

Note: Problems 1 and 2 refer to Graph I.

1. If the alternator-to-engine drive ratio is 3:1 and the engine at idle is 500 rpm, find from the graph the output for the alternator indicated by the graph of A.

GRAPH I



Solution:

The rpm of the alternator would be 1500. Corresponding to this, we read 20 amps.

2. If the output is 20 amps and this is continued for 4 hours, how many ampere-hours are generated?

Solution:

(20 amp)(4 hours) = 80 ampere-hours.

2. Problems with Solutions (continued)

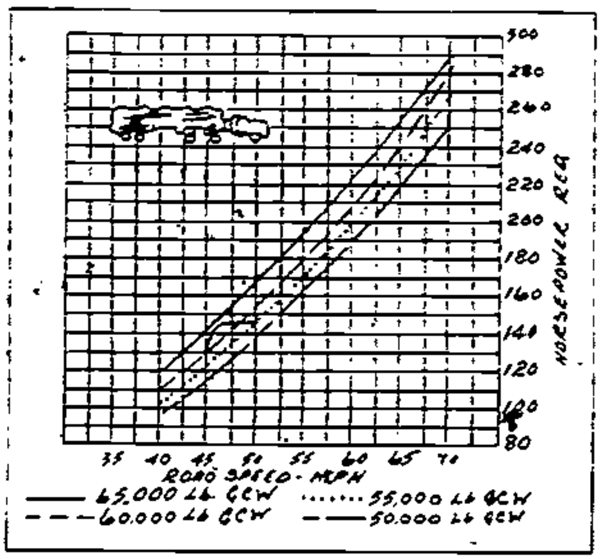
Note: Problems 3 and 4 refer to Graph II.

Horsepower Requirements of Four Axle Tractor Semi-Trailers

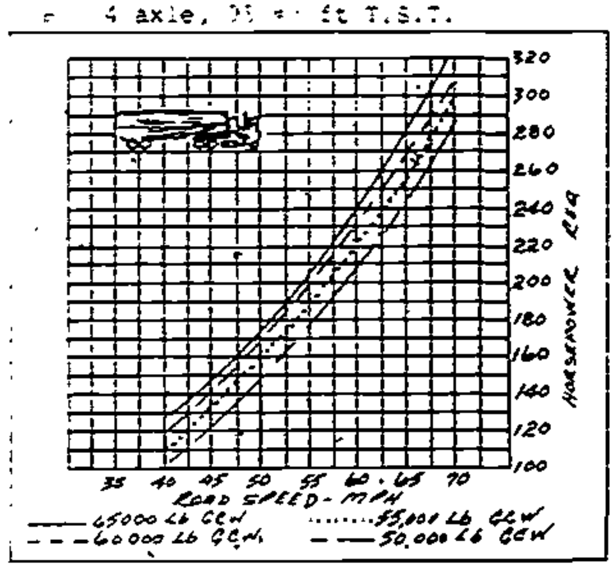
Four axle tractor semi-trailer units usually haul 55,000 to 65,000 lbs GCW. The most usual legal limit is 5[illegible],000 lbs, but some states with heavier allowable axle loading permit higher gross. For total horsepower requirements when pulling 75 sq ft, 95 sq ft and 108 sq ft frontal area trailers see the charts on this page.

GRAPH II

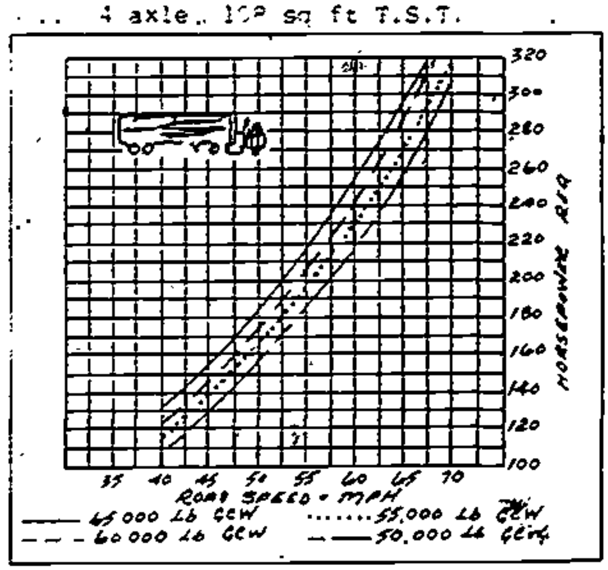
4 axle, 75 sq ft T.S.T.



4 axle, 95 sq ft T.S.T.



4 axle, 108 sq ft T.S.T.



A. Problems with Solutions-(continued)

3. From the graphs (Graph II), what would be the required horsepower for a 4 axle, 75 sq ft frontal area truck hauling 55,000 lbs at 55 mph?

Solution:

Looking at graph A, and going up the 55 mph line until we cross the line of dots we see this corresponds with 170 hp.

4. What road speed could be expected from a 4 axle, 108 sq ft frontal area truck hauling 55,000 lbs with rated horsepower of 250?

Solution:

Approximately 62.5 mph using graph C.

A. Problems with Solutions (continued)

Note: Problem 5 refers to Chart III.

CHART III

HOW TO MEASURE THE GAUGE OF CABLE

SIZE AND AREA OF WIRE		
(A) WIRE DIAMETER (INCHES)	(B) AMERICAN WIRE GAUGE	(C) CIRCULAR MIL AREA
.4600	0000	211600
.4096	000	167800
.3648	00	133100
.3249	0	105500
.2893	1	83690
.2576	2	66370
.2294	3	52640
.2043	4	41740
.2893	1	83690
.2576	2	66370
.2294	3	52640
.2043	4	41740
.1620	6	26250
.1285	8	16510
.1019	10	10380
.0808	12	6530
.0640	14	4107
.0508	16	2583
.0403	18	1624
.0319	20	1022
.0284	21	810.1
.0253	22	642.4
.0225	23	509.5
.0201	24	404.0
.0179	25	320.4
.0159	26	254.1
.0142	27	201.5
.0126	28	159.8
.0112	29	126.7
.0100	30	100.5
.0089	31	79.70
.0079	32	63.21

A. Problems with Solutions (continued)

CHART III: How to Measure The Gauge of Cable

To determine the gauge of a cable, using the table, proceed as follows:

(1) Count the number of strands of wire.

(2) Measure the diameter of a single strand in thousandths of an inch, using a micrometer.

(3) In column A of the table, find the diameter of the wire you have measured, and on the same line, in column C, find its area.

(4) Multiply the area of a single wire by the number of strands, to get the total area.

(5) In column C, find the figure that is closest to the total area obtained by step 4, and on the same line, in column B, note the gauge number of a single wire having that area. This number is the gauge of the cable.

5. A cable is found to have 19 strands of wire, the individual strands (measured by micrometer) are 0.0112 inches in diameter. Find the gauge of the cable.

Solution:

The table (column C) shows the circular mil area of each strand to be 127. Multiplying this by the number of strands, 19, results in 2413 total circular mils. The closest figure in Column C is 2583, and on the same line, in Column B, we find that 16 is the nearest cable gauge.

B. Problems without Solutions

6. Refering to Graph I (for problem 1), if the engine idles at 500 rpm for 4 hours and runs at 35 mph for 4 hours assuming engine rpm to be 50 rpm for each mph, what are the ampere-hours generated if the alternator-to-engine drive ratio is 2:1? (Assume we are using alternator "B".)

B. Problems without Solutions (Continued)

7. Continuing with the above problem, would the alternator B (output 304) be the correct choice in a system in which the draw would be 280 ampere-hours? (Would it be adequate?) Remember that 280 ampere-hours must represent no more than 80% of total output.

8. Refer to Graph II to find the required horsepower for a 4 axle, 95 sq ft frontal area truck hauling 65,000 lbs at 60 mph.

9. A four axle 95 sq ft frontal area truck with 220 horsepower traveling at 60 mph could expect to haul how much? (Refer to Graph II)

10. A 220 hp truck carrying 50,000 lbs and traveling at 65 mph would probably have what frontal area (Refer to Graph II)

11. A 170 hp 4 axle truck with 95 sq ft frontal area carrying 50,000 lbs could expect to travel at what road speed? (Refer Graph II)

B. Problems without Solutions (continued)

12. From information on Chart III, find the gauge of cable required if it has 37 strands and the diameter of each is 0.0126 inches.

13. Find the gauge for 61 strands if the diameter of each is 0.0142 inches. (See Chart III)

Refer to the Grade Horsepower Table (and possibly the previous graphs) to answer the next four problems.

14. Hauling 76,800 lbs on a level road at 30 mph requires what horsepower?

15. Hauling 76,800 lbs on a one degree grade at 30 mph requires what horsepower?

16. Hauling 73,280 lbs on a three degree grade at 20 mph requires what horsepower?

17. If the frontal area of the truck is 95 sq ft, hauling 65,000 lbs on a two degree grade at 40 mph requires what horsepower? (Also see graph)

GRADE HORSEPOWER

The horsepower required to climb grades of 1% to 5% at speeds of 10 mph to 50 mph are shown in the tables below. To meet operating requirements of roads with minimum speeds on grades, add the appropriate figure from the percent grade column to the horsepower requirements shown in the level road column. Air resistance is not included in the figures in the table: Below 30 mph, air resistance horsepower is negligible. Above 30 mph, grade horsepower should be added to the figures on graphs, page

Grade Horsepower Requirements

76,800 lbs GCW

mph	Level Road	1%	2%	3%	4%	5%
10	23	30	47	71	95	118
20	48	58	95	144	190	236
30	71	88	142	213	284	314
40	95	117	189	285	377	469
50	118	147	236	354	473	588

73,280 lbs GCW

mph	Level Road	1%	2%	3%	4%	5%
10	23	29	45	68	91	114
20	45	57	91	137	182	226
30	67	85	137	205	273	340
40	89	114	181	271	363	453
50	113	142	228	341	455	566

65,000 lbs GCW

mph	Level Road	1%	2%	3%	4%	5%
10	20	25	40	60	83	101
20	40	50	80	120	160	200
30	60	75	121	180	240	300
40	80	100	150	240	320	400
50	100	125	201	299	400	500

55,000 lbs GCW

mph	Level Road	1%	2%	3%	4%	5%
10	16	20	33	49	65	81
20	33	40	65	98	130	162
30	49	60	98	146	194	242
40	64	81	129	192	257	321
50	79	101	161	241	322	401

B. Problems without Solutions (continued)

18-27. From the chart find the fuel costs per mile when the miles per gallon and price per gallon is given.

	Miles/gal	Price/gal	Cost/mile
18.	12	24¢	
19.	10	25¢	
20.	8.8	22¢	
21.	8.0	20¢	
22.	7.0	23¢	
23.	7.6	22¢	
24.	6.4	24¢	
25.	5.6	25¢	
26.	5.0	21¢	
27.	4.8	23¢	

FUEL COST PER MILE

Miles Per Gallon	Price Per Gallon $0.20	$0.21	$0.22	$0.23	$0.24	$0.25
12.0	.0167	.0175	.0183	.0192	.0200	.0208
11.0	.0182	.0191	.0200	.0209	.0218	.0227
10.0	.0200	.0210	.0220	.0230	.0240	.0250
8.8	.0227	.0239	.0250	.0261	.0273	.0284
8.4	.0238	.0250	.0262	.0274	.0286	.0298
8.0	.0250	.0263	.0275	.0288	.0300	.0313
7.8	.0256	.0269	.0282	.0295	.0308	.0321
7.6	.0263	.0276	.0289	.0303	.0316	.0329
7.0	.0286	.0300	.0314	.0329	.0343	.0357
6.4	.0313	.0328	.0344	.0359	.0375	.0391
5.6	.0357	.0375	.0393	.0411	.0429	.0446
5.0	.0400	.0420	.0440	.0460	.0480	.0500
4.8	.0417	.0438	.0458	.0479	.0500	.0521
4.6	.0435	.0457	.0478	.0500	.0522	.0556
4.0	.0500	.0525	.0550	.0575	.0600	.0625
3.8	.0526	.0553	.0579	.0605	.0632	.0658
3.6	.0556	.0583	.0611	.0639	.0667	.0694

Complete Solutions to B Problems

6. At engine idle, the alternator turns at (2)(500 rpm) = 1000 rpm. From the graph of B corresponding to 1000, we read approximately 18 amps. (18 amps)(4 hours) = 72 amp-hours.

For the engine running at 35 mph, (50 rpm/mph)(35 mph) = 1750 rpm, so the alternator runs at (2)(1750 rpm) or 3500 rpm. Corresponding to this on the graph of B, we have approximately 58 amps. (58 amp)(4 hours) = 232 amp-hrs. Total ampere-hours generated:

72 amp-hrs + 232 amp-hrs = 304 amp-hrs.

7. No. Remember that the 280 ampere-hours should represent no more than 80% of the total desired.

$\frac{280 \text{ amp-hrs}}{0.80}$ = 350 amp-hrs required for adequate operation.

8. 240 hp.

9. 55,000 lbs.

10. 75 square feet.

11. Approximately 57 mph.

12. The circular mil area is 159.8 for each strand.

37 strands: (37 strands)(159.8 cir mil/strand) = 5912.6 cir mils

The closest number to this in column C is 6530. Across from it, in column B, we read 12, therefore, gauge 12.

13. (201.5 cir miles/strand)(61 strand) = 12,291.5 cir mils; this is the closest number to 10380, so gauge 10 should serve.

Complete Solutions to B Problems (continued)

14. 71 hp

15. 71 hp + 88 hp = 159 hp

16. 45 hp + 137 hp = 182 hp

17. (80 hp + 150 hp) + 125 hp = 355 hp

18-27.

18. $0.0200/mile
19. $0.0250/mile
20. $0.0250/mile
21. $0.0250/mile
22. $0.0329/mile
23. $0.0289/mile
24. $0.0375/mile
25. $0.0446/mile
26. $0.0420/mile
27. $0.0479/mile

TABLE 10

Containers for Frozen Fruits and Vegetables

Common consumer size containers for frozen fruits and vegetables are 10 ounce, 12 ounce, 14 ounce, and 16 ounce packages depending upon the commodity. Some products are also packed in larger containers for institutional and for retail purchases. Vegetables packed in 2 pound, 2-1/2 pound and 5 pound packages and fruits in 2-1/2 pound, 10 pound, 15 pound, and 30 pound containers are most common.

The percentage figures for losses in preparation of raw product for freezing are approximate and are given for the purpose of guidance only.

Vegetables	Common Packages and Usual Packing per Case	Approximate Losses in Preparation of Raw Product for Freezing	Fruits	Common Packages and Usual Packing per Case	Approximate Losses in Preparation of Raw Products for Freezing
Asparagus	12-1/2 lb 24-12 oz 24-10 oz	54%	Apples	30 lb	50%
Lima Beans	12-2½ lb 24-12 oz	63%	Apricots	30 lb 10 lb 24-1 lb	22%
Snap Beans	12-2½ lb 24-12 oz 24-10 oz	21%	Blackberries	Barrels 30 lb	5%
Broccoli	8-4 lb 12-2 lb 24-10 oz	45%	Blueberries	Barrels 30 lb 10 lb 24-1 lb or less	
Brussels Sprouts	8-4 lb 12-2 lb 24-10 oz	45%	Cherries	Barrels 30 lb 24-1 lb	25%
Carrots	12-2½ lb	50%	Peaches	30 lb 10 lb 24-1 lb 24-12 oz	33%
Cauliflower	8-4 lb 12-2 lb 24-10 oz	70%	Prunes and Plums	Barrels 30 lb	15%
Corn	12-2½ lb 24-12 oz 24-10 oz	76%	Raspberries	Barrels 30 lb 24-1 lb 24-12 oz	

TABLE 10 (continued)

Vegetables	Common Packages and Usual Packing per Case	Approximate Losses in Preparation of Raw Product for Freezing
Peas	6-5 lb 12-2½ lb 24-12 oz 24-10 oz	60%
Carrots and Peas	12-2½ lb 24-12 oz	60%
Spinach	12-3 lb 12-2½ lb 24-14 oz	45%
Squash and Pumpkin	24-1 lb	35%
Succotash	24-12 oz 24-11 oz 24-10 oz	
Mixed Vegetables	12-2½ lb 24-12 oz	

Fruits	Common Packages and Usual Packing per Case	Approximate Losses in Preparation of Raw Products for Freezing
Rhubarb	30 lb 24-16 oz	15%
Strawberries	Barrels 30 lb 24-1 lb 24-12 oz	7%
Youngberries, Loganberries and Boysenberries	Barrels 30 lb 10 lb	5%

A. Problems with Solutions

1. Condition of container inspection.

Before the government will accept a shipment, the packer must submit a condition of container report. This report is based on a statistical sampling technique.

Refer to 42.109 Table I-A and assume that the number of containers is 5,540 and a double sampling plan is to be used.

From a random sample of 36 containers you find: 3 minor defects/ 2 major defects and no critical defect.

Would you accept, reject or move on to the second sample size, which would be a sample of 60 containers?

DEFINITIONS: In general terms, the minor defects in cans are small dents and scratches, major defects are large dents that make the cans difficult to open and critical defects are health hazards.

Solution:

Since the minor plus major plus the critical equal five, the total falls between the 2 acceptance level and the seven rejection level; you must proceed to randomly sample 60 containers.

2. Refer to Table 3.

(a) These strawberries are under a 45% level. You have counted 30, 40, 50 fields and the positive fields have been between the acceptance or rejection numbers on Table 3. Upon counting 60 fields you have marked 26 positive. Do you accept or reject this sample?

(b) These caneberries come under a 20% level you have counted 50 fields and found 9 positive for mold. Do you accept, reject or count 60 fields?

Solution:

(a) Accept.

(b) Count 60 fields.

B. Problems without Solutions

3. Determining SO_2 solution from a graph.

(a) The amount of SO_2 solution required to turn a 0.2 Normal solution of Iodine purple was found to be 12 cubic centimeters. Was the SO_2 solution acceptable?

(b) The amount of SO_2 solution required to turn a 0.2 Normal solution of Iodine purple was found to be 15 cubic centimeters. Was the SO_2 solution acceptable?

4. Determining SO_2 solution from a graph.

Refer to the same graph as problem 3.

If 30 cubic centimeters of SO_2 solution are required to turn 25 c.c. of 0.2 Normal Iodine Solution purple, what is the percent of SO_2 in solution?

DEFINITION: Estimation of Fruit-Sugar Ratio by use of a Table.

Example: Follow the horizontal line across the chart to the Brix value of the finished product (28.5). Follow this vertical column downward to the ratio opposite Brix of fruit value of 8.0. The value at the intersection of the two lines is the theoretical ratio. By referring to the table and interpolating to the nearest value shown in the table, a fruit Brix of 8.0 and a finished product Brix of 28.4 is 3.51.

5. (a) If the Brix of the sweetened product is 22.5 and the Brix of the fruit was 8.0, what is the ratio of fruit to sugar?

(b) If the Brix of the sweetened product is to be 28.00 and 4 parts fruit, one part sugar, what must the Brix of the fruit be?

Complete Solutions to B Problems

3. (a) Acceptable.

(b) Not acceptable.

4. Solution = 0.5%

5. (a) Ratio of fruit to sugar = 5.34

(b) Brix of the fruit = 10.0

TABLE I-A-SAMPLING PLANS OF SELECTED AQL'S FOR NORMAL CONDITION OF CONTAINER INSPECTION

Code	Lot size rangers-Number of containers in lot	Type of plan	Sample size		Acceptable quality levels					
					Crit		Major		Total	
					Ac	Re	Ac	Re	Ac	Re
CA	6,000 or less	Double.	1st	36	(*)	(*)	0	4	2	7
			2d	60						
			Total.....	96	(*)	(*)	3	4	10	11

(*)=Reject on one or more defects

TABLE 2

RATIO PARTS OF FRUIT TO ONE PART SUGAR BY WEIGHT

Brix of Fruit	Brix of Sweetened Product 22.5	23.0	Brix of Fruit	Brix of Sweetened Product 27.5	28.0
0.0	3.44	3.35	0.0	2.64	2.57
0.5	3.52	3.42	0.5	2.69	2.62
1.0	3.60	3.50	1.0	2.74	2.67
1.5	3.69	3.58	1.5	2.79	2.72
2.0	3.78	3.67	2.0	2.84	2.77
2.5	3.88	3.70	2.5	2.90	2.82
3.0	3.97	3.85	3.0	2.96	2.88
3.5	4.08	3.95	3.5	3.02	2.94
4.0	4.19	4.05	4.0	3.09	3.00
4.5	4.31	4.16	4.5	3.15	3.06
5.0	4.43	4.28	5.0	3.22	3.13
5.5	4.56	4.40	5.5	3.30	3.20
6.0	4.70	4.53	6.0	3.37	3.27
6.5	4.84	4.67	6.5	3.45	3.35
7.0	5.00	4.81	7.0	3.54	3.46
7.5	5.17	4.97	7.5	3.63	3.51
8.0	5.34	5.13	8.0	3.72	3.60
8.5	5.54	5.31	8.5	3.82	3.69
9.0	5.74	5.50	9.0	3.92	3.79
9.5	5.96	5.70	9.5	4.03	3.89
10.0	6.20	5.92	10.0	4.14	4.00
10.5	6.46	6.16	10.5	4.26	4.11
11.0	6.74	6.42	11.0	4.39	4.24
	7.05	6.70	11.5	4.53	4.36
	7.38	7.00	12.0	4.68	4.50
	7.75	7.33	12.5	4.83	4.65

TABLE 3

MULTIPLE SAMPLING PLANS FOR MOLD COUNTS

20% Level			45% Level		
n_c	c	r	n_c	c	r
30	3	10	30	10	18
40	5	12	40	14	23
50	7	14	50	18	27
60	9	16	60	23	32
70	11	18	70	27	36
80	13	20	80	32	41
90	15	22	90	36	46
100	17	23	100	41	50
110	20	23	110	46	54
120	24	25	120	54	55

A_c = Acceptance Number

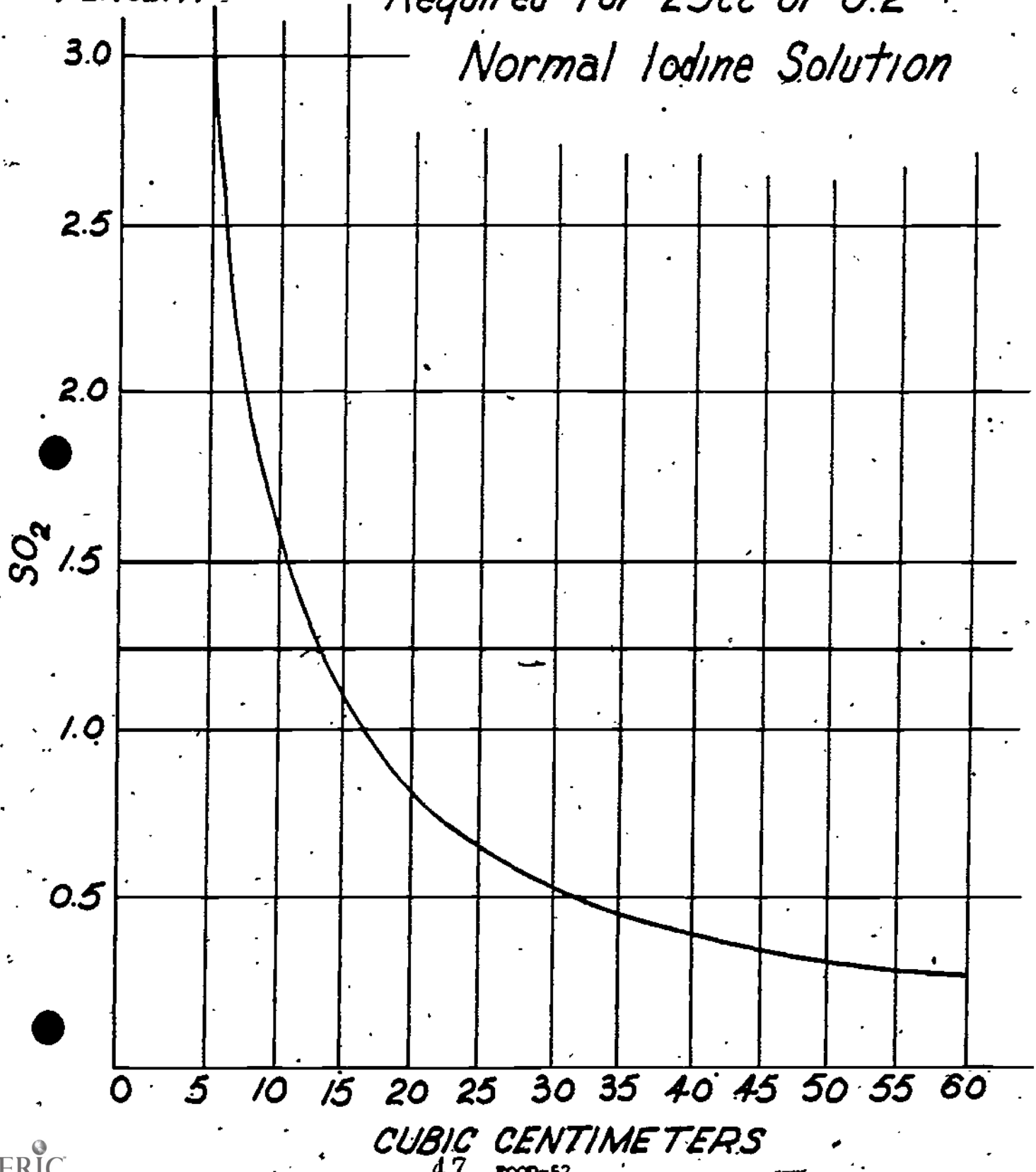
n_c = The cumulative number of fields to count.

c = The maximum cumulative number of positive fields permitted to accept the sample unit for the appropriate percent mold level.

r = The minimum cumulative number of positive fields necessary to fail the sample unit for the appropriate percent mold level.

Graph

Cubic Centimeters of SO_2 Solution Required for 25cc of 0.2 Normal Iodine Solution



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Spinach	12-3 lb 12-2½ lb 24-14 oz	45%	Youngberries, Loganberries and Boysen-berries	Barrels 30 lb 10 lb	5%
Squash and Pumpkin	24-1 lb	35%			
Succotash	24-12 oz 24-11 oz 24-10 oz				
Mixed Vegetables	12-2½ lb 24-12 oz				